FACT SHEET FOR NPDES PERMIT WA-002954-8

CITY OF SNOHOMISH WASTEWATER TREATMENT PLANT

PURPOSE of this Fact Sheet

This fact sheet complies with Chapter 173-220-060 of the Washington Administrative Code (WAC) requiring that a draft permit *and accompanying fact sheet* be prepared prior to the issuance of an NPDES, or National Pollutant Discharge Elimination System, permit. The draft permit and fact sheet must be available for public review and comment at least thirty (30) days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit for the City of Snohomish Wastewater Treatment Plant, NPDES permit WA-002954-8, were available for public review and comment from June 22, 2006, to July 22, 2006. For more detail on how to file comments, please see Appendix A - Public Involvement.

The City of Snohomish has reviewed the Permit for factual accuracy. The Department of Ecology (Ecology) corrected any errors and omissions identified in this review before going to public notice. After the public comment period has closed, Ecology will summarize the substantive comments and respond to each comment. The summary and response to comments will be in Appendix E, Response to Comments, and included in the permit file. Parties submitting comments will receive a copy of Ecology's response. For further detail, please see a complete explanation in Section I - Introduction.

SUMMARY of this Fact Sheet

The City of Snohomish (City) operates an aerated lagoon wastewater treatment plant that discharges to the Snohomish River. The previous permit for this facility was issued on April 14, 2000, and modified on February 24, 2003.

The proposed permit contains the same effluent limits for Carbonaceous Biochemical Oxygen Demand ($CBOD_5$), Total Ammonia, Fecal Coliform Bacteria, and pH as the permit modification issued in 2003. Limits for Total Ammonia and $CBOD_5$ during the months of July through October are based on the Total Maximum Daily Load for the Snohomish Estuary (Ecology, 1999).

The proposed permit has revised limits for Total Suspended Solids (TSS), which reflect the actual performance of the treatment plant. Ecology has adjusted the chlorine limits slightly based on current data.

Ecology has evaluated the need for limits on toxic metals in the effluent. When the outfall diffuser is installed, there will be no reasonable potential for violations of the water quality criteria. To confirm this conclusion, the permit requires ongoing quarterly testing for copper, silver, and zinc.

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I. INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the State of Washington to administer the NPDES permit program. Chapter 90.48 RCW defines Ecology's authority and obligations in administering the Wastewater Discharge Permit Program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that the Department of Ecology issue a permit before allowing discharge of wastewater to waters of the state. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. To issue a permit under the NPDES permit program, Ecology must prepare a draft permit and an accompanying fact sheet. Ecology must publish public notice of the availability of the draft permit at least thirty (30) days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit for the City of Snohomish are available for review. For further information on where to send comments and the Public Notice procedure see Appendix A - Public Involvement.

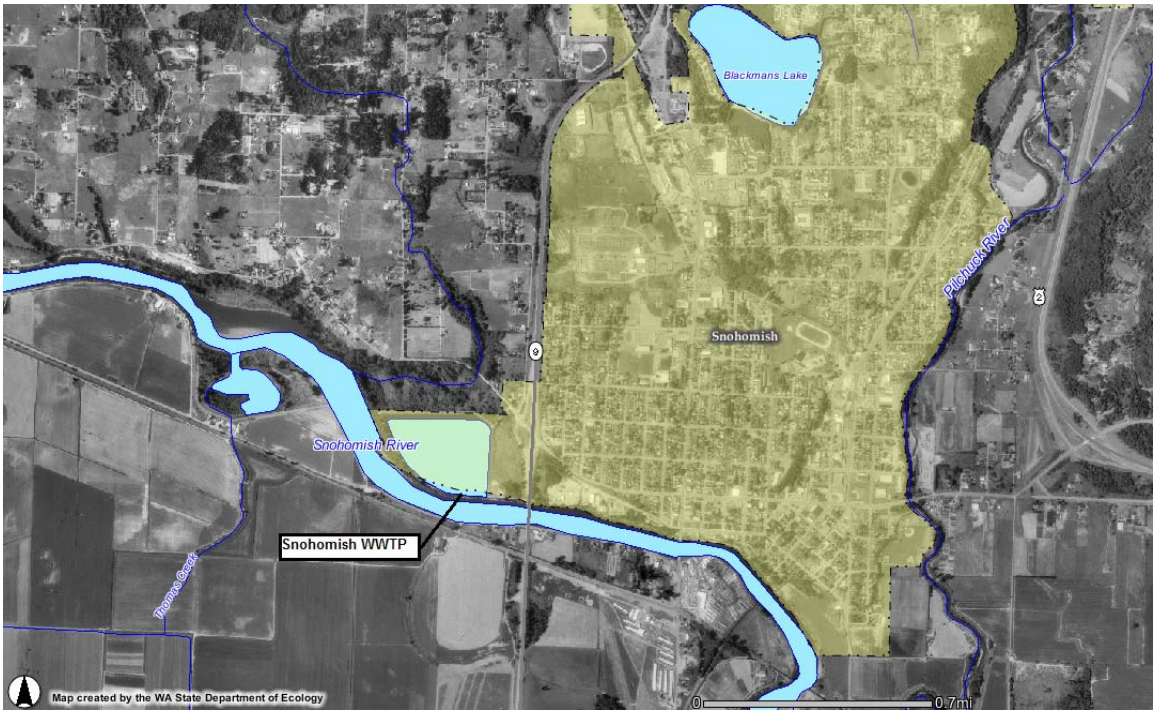
The City of Snohomish has reviewed the Permit for factual accuracy. Ecology corrected any errors and omissions identified in this review before going to public notice. After the public comment period has closed, Ecology will summarize the substantive comments and respond to each comment. The summary and response to comments will become part of the permit file and parties submitting comments will receive a copy of Ecology’s response. Comments and the resultant changes to the permit will be summarized in Appendix E - Response to Comments.

II. BACKGROUND INFORMATION

Table 1. General Facility Information

Applicant:	City of Snohomish
Facility Name and Address:	Snohomish Wastewater Treatment Plant 2115 Second Street Snohomish, WA 98290
Type of Treatment:	Dual power aerated lagoon
Discharge Location:	Snohomish River Latitude: 47º 54' 46" N Longitude: 122º 06' 38" W
Waterbody ID Number:	WA-07-1020 1222080480202

Figure 1. Facility Location Map



A. Description of the Facility

History:
The City's sewage treatment plant is located in the southwest corner of the City, just north of the Snohomish River and west of State Route 9. The original sewage treatment plant, a 40-acre facultative stabilization lagoon with chlorine disinfection, was constructed in 1958. The City added a new chlorine contact tank and chlorine feed and mixing equipment in 1989, as well as a new outfall.

In 1995, the City upgraded the facility to a multi-lagoon aerated system. A new headworks was constructed, consisting of three influent screw pumps, a rotary screen, and a manually cleaned bar screen. The new lagoon system consists of four aerated lagoons on ten acres of the old system. A completely mixed aerated basin is followed by three equal-volume partially mixed settling basins. The City is not currently using the remaining 30 acres of the old lagoon. The 1995 upgrade also included an effluent filtration system and dechlorination facilities.

Collection System Status:
The first sewage collection systems were installed in the early 1900s and operated as a combined sanitary and storm sewer system with numerous outfalls to the Snohomish River. The City expanded its combined sewer system to meet the needs of population growth until the 1950s. More recently constructed sewers are separate sanitary sewers.

The portion of the City's sewer system outside the combined sewer area consists of PVC and concrete sewer pipe, most of which have been installed since the late 1950s. There are 14 sewage pump stations, three of which pump flows from the combined sewer area.

On-Site Sewer Systems:
The City has estimated that about 100 households within the city limits, or four percent of the population, are using on-site sewer systems. Outside the city limits but within the City's urban growth boundary, all of the residences and businesses have on-site sewer systems.

Combined Sewer Overflows:
The downtown area of Snohomish has combined sanitary and storm sewers. This portion of the sewer system is approximately 100 years old. The combined system has two overflows (CSOs) that discharge untreated wastewater directly into the Snohomish River when the sewer system's capacity is exceeded because of rainfall. The City's monitoring equipment recorded overflows at CSO #1 on 36 days in 2003 and at CSO #2 on 73 days in 2003, for a total of about 4.3 million gallons discharged to the Snohomish River.

Treatment Plant and Collection System Improvements:

The *General Sewer Plan & Wastewater Facilities Plan* (Tetra Tech/KCM, May 2005) describes proposed improvements to the treatment facilities and the sewer collection system. Upgrades to the wastewater treatment plant include converting the lagoon system to a SBR (sequencing batch reactor) process, effluent filtration, and UV disinfection. The City plans to construct the upgrades in 2009. Pump station and sewer improvements will reduce CSOs to one per year. The long term plan includes separation of combined sewers to eventually eliminate all CSOs.

Treatment Processes:

Figure 2 shows the treatment plant site plan. The major facilities at the plant are as follows:

- Influent and effluent flow monitoring.
- Headworks (screw pumps, screening system).
- Laboratory, control and maintenance building.
- Four aerated lagoon cells.
- Sand filtering system.
- Emergency overflow structure.
- Chlorination facility (building and chlorine contact tank).
- Outfall to Snohomish River.

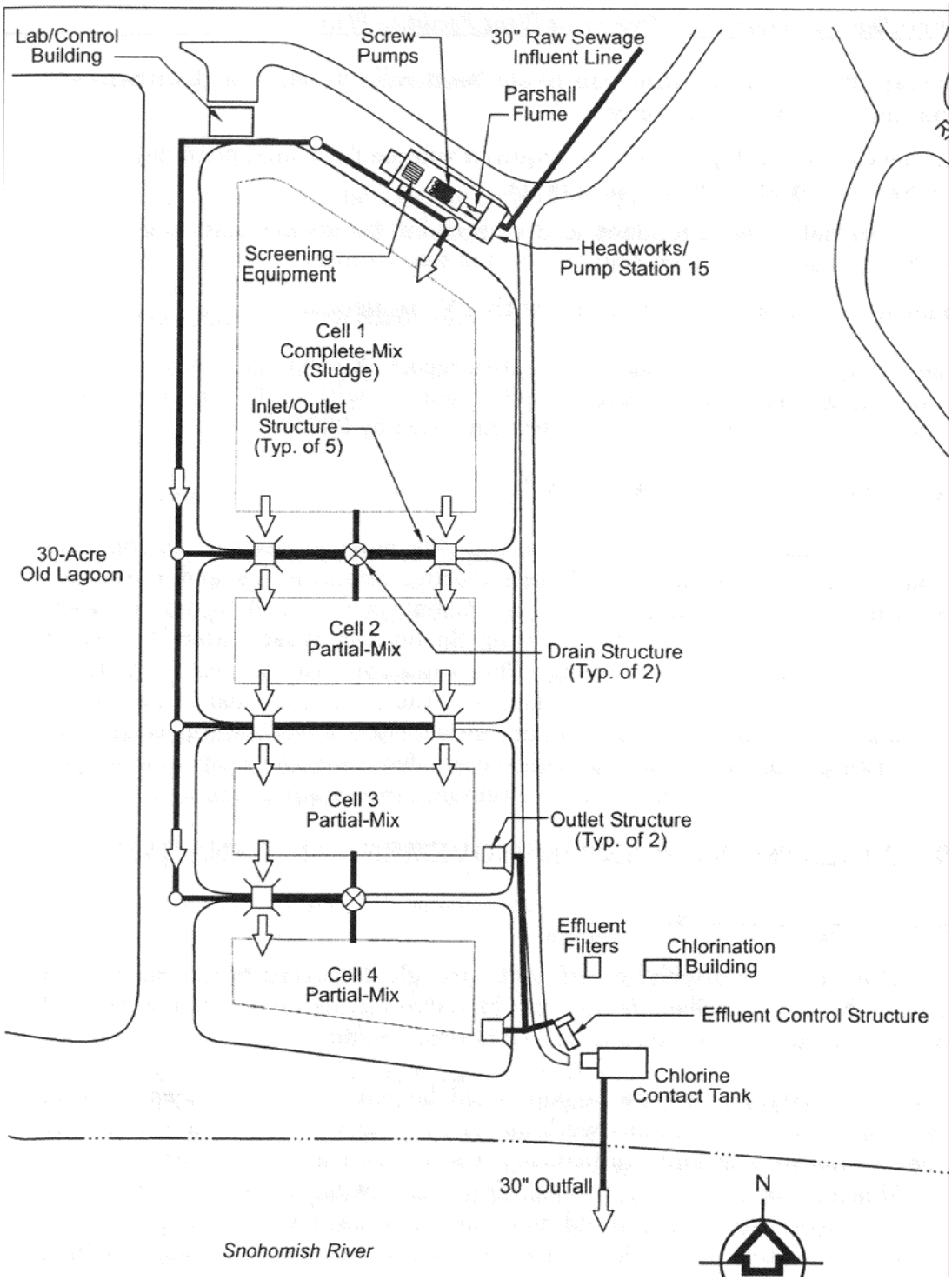
Discharge Outfall:

The outfall to the Snohomish River is an open-ended 30-inch diameter pipe discharging from the side bank at a depth of approximately 14 feet at low flow in the river. In a Stipulation and Agreed Order of Dismissal before the Pollution Control Hearings Board dated October 24, 2001, the City of Snohomish agreed to construct a 4-port diffuser no later than October 31, 2003. The 4-port diffuser has not yet been installed, but the City has completed plans and environmental permitting to allow installation during the summer of 2006. The proposed permit includes a requirement for the City to complete installation of the outfall by November 2006.

Residual Solids:

Waste sludge is currently stabilized and stored in the three partially mixed lagoons. The completely mixed lagoon was designed to keep solids in suspension and not accumulate sludge. Since the facility began operation in 1995, sludge has never been removed.

Figure 2. Snohomish Site Plan



B. Permit Status

Ecology issued the previous permit for this facility on April 14, 2000. Snohomish filed an appeal of the permit, contesting the effluent limitations for copper and carbonaceous biochemical oxygen demand ($CBOD_5$). Ecology and Snohomish signed a Stipulation and Agreed Order of Dismissal on October 24, 2001. The conditions of the agreement included a revised mixing zone study, construction of a 4-port outfall diffuser, interim effluent limits for copper, and a stay of the TMDL-based limits for $CBOD_5$ during the month of October. Ecology issued a modification to the permit on February 24, 2003, and the appeal was dismissed on March 20, 2003. The previous permit placed effluent limitations on 5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$), Total Suspended Solids (TSS), pH, Fecal Coliform bacteria, chlorine, ammonia, and copper.

The City submitted an application for permit renewal on February 10, 2004. Ecology determined it to be complete on February 20, 2004.

C. Summary of Compliance with the Previous Permit

Department of Ecology staff last conducted a compliance inspection with sampling on August 3, 2004. The laboratory, plant records, and operations and maintenance appeared to be in good order and in compliance with permit requirements. The samples taken on that day showed high fecal coliform numbers, apparently due to partial denitrification in the lagoons. Samples analyzed the next week showed fecal coliform well under permit limits.

Since the 2003 permit modification, the facility has reported violations of permit effluent limits as follows:

- $CBOD_5$: monthly average lb/day limit exceeded in September 2003 and September 2004.
- $CBOD_5$: daily maximum lb/day limit exceeded in September 2003, September 2004, and September 2005.
- Fecal Coliform: weekly average limit exceeded in November and December 2003.
- Ammonia Nitrogen: monthly average mg/L limit exceeded in May, June, July, and August 2003.
- Ammonia Nitrogen: daily maximum mg/L limit exceeded in July 2003.
- Ammonia Nitrogen: monthly average lb/day limit exceeded in July 2003; July, August, September and October 2004; July and August 2005.
- Ammonia Nitrogen: daily maximum lb/day limit exceeded in July and October 2004.
- Total Suspended Solids: monthly average lb/day limit exceeded in March and November 2003.
- Total Suspended Solids: weekly average lb/day limit exceeded in March and November 2003.

The facility has had trouble meeting the TMDL-based limits for ammonia, because the treatment plant does not effectively remove this pollutant. The planned treatment plant upgrades will help correct this problem. The violations of the TSS limits are primarily the result of the previous permit's unusual definition of those limits, rather than a failure of the treatment plant. This permit contains revised TSS limits.

D. Wastewater Characterization

The concentration of pollutants in the discharge was reported in the NPDES application and in Discharge Monitoring Reports. The effluent is characterized as follows:

Table 2: Typical Wastewater Pollutants

Parameter	Average Concentration
$CBOD_5$	9 mg/l
TSS	22 mg/l (Jul-Oct)
	12 mg/l (Nov-Jun)
Fecal Coliform	15 CF/100 ml
	(range 0-166)
Dissolved Oxygen	5.2 mg/l
Phosphorus (total)	4.4 mg/l
Hardness	44.5 mg/l as $CaCO_3$
Temperature (summer)	20.8 °C
Parameter	95^{th} Percentile Value
Ammonia (as N)	33 mg/l
Copper	14.8 µg/l
Chlorine	94.0 µg/l
Zinc	33 µg/l
Parameter	Maximum Value
Cadmium	0.3 µg/l
Lead	2.0 µg/l
Selenium	2.0 µg/l
Silver	1.4 µg/l
Acetone	6.7 µg/l
Chloroform	2.2 µg/l
Toluene	6.1 µg/l
bis (2-Ethylhexyl) phthalate	37 µg/l
Phenol	0.08 mg/l

III. PROPOSED PERMIT LIMITATIONS

Federal and state regulations require that effluent limitations set forth in an NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the surface water quality standards (Chapter 173-201A WAC), ground water standards (Chapter 173-200 WAC), sediment quality standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most stringent of technology- or water quality-based limits must be chosen for each of the parameters of concern. These limits are described below.

The limits in this permit are based, in part, on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. Ecology determined the limits necessary to meet the rules and regulations of the State of Washington and included them in this permit. Ecology does not develop effluent limits for all pollutants that the City reports on the application as present in the effluent**.** Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Ecology does not always develop effluent limits for pollutants that may be in the discharge but are not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR 122.42(a), the City of Snohomish is required to notify Ecology. The City may be in violation of the permit until Ecology modifies the permit to reflect the changes in the discharge of pollutants.

A. Design Criteria

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria. The design criteria for this treatment facility are taken from the engineering report and the final construction plans and specifications. They are:

Table 3: Design Standards for City of Snohomish WWTP

Parameter	Design Quantity
Annual average flow	2.04 MGD
Maximum month flow	2.8 MGD
Average dry weather month flow	1.15 MGD
Peak day flow	9.9 MGD
Peak hour flow	30.9 MGD
Maximum month BOD_5 influent loading	3,960 lb/day
Maximum month TSS influent loading	4,400 lb/day

B. Technology-based Effluent Limitations

Federal and state regulations define technology-based effluent limits for municipal wastewater treatment plants. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (federal) and in Chapter 173-221 WAC (state). These regulations are performance standards that constitute all known, available, and reasonable methods of prevention, control, and treatment (AKART) for municipal wastewater.

The following technology-based limits for pH, fecal coliform, $CBOD_5$, and TSS are taken from Chapter 173-221 WAC.

Table 4: Technology-based Limits

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria:	*Monthly* Geometric Mean = 200 organisms/100 mL *Weekly* Geometric Mean = 400 organisms/100 mL
$CBOD_5$: (concentration)	*Average Monthly* Limit is the most stringent of the following: - 25 mg/L - may not exceed fifteen percent (15%) of the average influent concentration *Average Weekly* Limit = 40 mg/L
TSS: (concentration)	*Average Monthly* Limit = 30 mg/L *Average Weekly* Limit = 45 mg/L

The $CBOD_5$ limits shown above are used in place of BOD_5 limits, according to WAC 173-221-050(6).

Because the Snohomish treatment plant is an aerated lagoon, or "waste stabilization pond," it is eligible for alternative standards for TSS under WAC 173-221-050(2). In previous permits these limits have been set at 75 mg/L (average monthly limit) and 110 mg/L (average weekly limit) for flows up to 2 MGD. Discharge monitoring reports over the past five years show that the Snohomish treatment plant can consistently achieve much lower levels of TSS. For the months of November through June, no alternative limits are needed, and the permit includes the standard technology-based limits from Table 3 above. For the months of July through October the monthly average limit is 37 mg/L (the 95^{th} percentile value for the monthly average TSS during those months from 2000-2005). The corresponding weekly average limit is 1.5 x 37, or 56 mg/L.

The technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

These $CBOD_5$ limits will apply during the months of November through June:

Monthly effluent $CBOD_5$ mass loading (lb/day) is calculated as the maximum monthly design flow (2.8 MGD) x concentration limit (25 mg/L) x 8.34 (conversion factor) = mass limit 584 lb/day.

Weekly effluent $CBOD_5$ mass loading (lb/day) is calculated as the maximum monthly design flow (2.8 MGD) x concentration limit (40 mg/L) x 8.34 (conversion factor) = mass limit 934 lb/day.

$CBOD_5$ mass limits for the months of July through October are determined by the TMDL allocations.

These TSS limits will apply during the months of November through June:

Monthly effluent TSS mass loading (lb/day) is calculated as the maximum monthly design flow (2.8 MGD) x concentration limit (30 mg/L) x 8.34 (conversion factor) = mass limit 701 lb/day.

Weekly effluent TSS mass loading (lb/day) is calculated as the maximum monthly design flow (2.8 MGD) x concentration limit (45 mg/L) x 8.34 (conversion factor) = mass limit 1,051 lb/day.

These TSS limits will apply during the months of July through October:

Monthly effluent TSS mass loading (lb/day) is calculated as the dry weather design flow (1.15 MGD) x concentration limit (37 mg/L) x 8.34 (conversion factor) = mass limit 355 lb/day.

Weekly effluent TSS mass loading (lb/day) is calculated as the maximum monthly design flow (1.15 MGD) x concentration limit (56 mg/L) x 8.34 (conversion factor) = mass limit 537 lb/day.

C. Surface Water Quality-based Effluent Limitations

The water quality standards for surface waters of the state of Washington (Chapter 173-201A WAC) is a state regulation designed to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters. This regulation states that waste discharge permits shall be conditioned such that the discharge will meet established surface water quality standards (WAC 173-201A-060). Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily load study (TMDL).

Numerical Criteria for the Protection of Aquatic Life:
"Numerical" water quality criteria are numerical values set forth in the water quality standards for surface waters (Chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in the receiving water to protect aquatic life. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Numerical Criteria for the Protection of Human Health:
The U.S. EPA issued 91 numeric water quality criteria for the protection of human health for implementation by the state (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily based on fish and shellfish consumption and drinking water from surface waters.

Narrative Criteria:
In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations. Levels are set below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the state of Washington.

Antidegradation:
Washington State's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of higher quality than the criteria assigned, the existing water quality shall be protected. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

Ecology maintains a monitoring station for the Snohomish River at Snohomish. The monitoring station is located at the bridge on Avenue D in Snohomish, two blocks south of 2nd Street (Old Highway 2). Water quality at this station is of moderate concern according to the Water Quality Index calculated by Ecology's Freshwater Monitoring Unit. For more information see:
http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?sta=07A090.

Ambient Conditions:

Ambient background data used for this permit include the following:

Table 5: Ambient Parameters

Parameter	Value	Source
7Q20 low flow	1051 cfs	TMDL study, 1997
Temperature (90th percentile, 1994-2004)	17.6 °C	Ecology ambient monitoring database
Temperature (10th percentile, 1994-2004)	4.4 °C	Ecology ambient monitoring database
pH (90th percentile, 1994-2004)	7.4	Ecology ambient monitoring database
pH (10th percentile, 1994-2004)	7.0	Ecology ambient monitoring database
Hardness	19.3 mg/L as $CaCO_3$	Mixing Zone study, April 2001

Ammonia, total as N	0.1 mg/L	Ecology ambient monitoring database
Cadmium, dissolved (90^{th} percentile)	0.036 µg/L	TMDL study, 1997
Chlorine	0	Not expected to be present
Copper, dissolved (90^{th} percentile)	0.85 µg/L	TMDL study, 1997
Lead, dissolved (90^{th} percentile)	0.041 µg/L	TMDL study, 1997
Selenium	0	No data available
Silver	0 (not detected)	Ecology EIM database
Zinc, dissolved (90^{th} percentile)	3.2 µg/L	TMDL study, 1997

Critical Conditions:
Critical conditions means the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water uses. Water quality-based limits are derived to protect the water body at critical condition. The critical condition for the Snohomish River is the seven-day average low river flow with a recurrence interval of twenty years (7Q20). The 7Q20 discharge for the Snohomish River near Monroe is 1,051 cfs.

Mixing Zone:
This permit authorizes an acute and a chronic mixing zone around the point of discharge as allowed by the water quality standards (WAC 173-201A). The size and location of the allowed mixing zones are specified in the permit. Mixing zones can only be authorized if the conditions listed in WAC 173-201A-100 are met.

- The discharger shall be required to fully apply AKART. The technology-based effluent limits in Section III.B, above, are AKART for municipal effluent.

- Ecology has reviewed the characteristics of the discharge, the receiving water, and the discharge location. Based on this information, Ecology has determined that this discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with the use of the water, result in damage to the ecosystem, or adversely affect public health.

- Water quality criteria shall not be violated outside the boundary of the mixing zone. A reasonable potential analysis for each pollutant shows that the water quality criteria will not be violated.

- The size of the mixing zone and the concentrations of pollutants have been minimized by using conservative factors in the dilution calculations. For example, the 7Q20 low river flow was used to determine dilution factors; the reasonable potential analysis used the 95^{th} percentile pollutant concentration and the 90^{th} percentile background concentration.

- The acute mixing zone must not create a barrier to the migration or translocation of indigenous organisms. The acute mixing zone in the permit is limited to 21.4 feet, or less than six percent of the width of the river.

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

D. Description of Receiving Water

The facility discharges to the Snohomish River, which is designated as a Class A receiving water in the vicinity of the outfall. Other nearby point source outfalls include the City of Everett and the Lake Stevens Sewer District. Significant nearby non-point sources of pollutants include residential and commercial development, agricultural activities, and forestry. Characteristic uses include the following: water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning, and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

E. Surface Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Table 6: Surface Water Quality Criteria

Fecal Coliforms	100 organisms/100 mL maximum geometric mean
Dissolved Oxygen	8 mg/L minimum
Temperature	18 degrees Celsius maximum or incremental increases above background
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTUs above background
Toxics	No toxics in toxic amounts (see Appendix D for numeric criteria for toxics of concern for this discharge)

F. Consideration of Surface Water Quality-based Limits for Numeric Criteria

Pollutant concentrations in the proposed discharge exceed water quality criteria with technology-based controls which Ecology has determined to be AKART. Ecology has authorized a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions for mixing zones in Chapter 173-201A WAC. Because the flow of the Snohomish River reverses direction at high tides, the mixing zone size criteria for estuaries have been used.

1. The width of the mixing zone is limited to 25 percent of the width of the river (89 feet) and is centered on the outfall diffuser.

2. The length of the mixing zone extends 214 feet upstream and 214 feet downstream of the outfall diffuser.

3. The zone where acute criteria may be exceeded shall extend a distance of 21.4 feet in any horizontal direction from the diffuser and extend vertically to the surface

The dilution factors of effluent to receiving water that occur within these zones have been analyzed in the *City of Snohomish Amended Mixing Zone Study* (Cosmopolitan Engineering Group, April 2001). The dilution factors used to evaluate the potential for violations of the water quality standards in this permit are:

Table 7: Dilution Factors

	Acute Dilution	Chronic Dilution
Aquatic Life – existing outfall	4.0	28
Aquatic Life – with 4-port diffuser	11.0	28
Human Health, Carcinogen	N/A	28
Human Health, Non-carcinogen	N/A	28

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants. Their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as Biochemical Oxygen Demand (BOD) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect. The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

The impacts of BOD, temperature, pH, fecal coliform, ammonia, metals, and other toxics were determined as described below, using the dilution factors in Table 4.

BOD: Ecology has conducted a total maximum daily load (TMDL) study on the Snohomish River Estuary, from Possession Sound to river mile 20. The WASP5 model was used to assess the capacity of the estuary system to assimilate oxygen consuming pollutants from point and nonpoint sources. The water quality model predicted that the wastewater treatment plants along the river would cause violations of the dissolved oxygen standards under critical conditions. The TMDL study recommended waste load allocations (WLAs) for the following point sources of carbonaceous and nitrogenous biochemical oxygen demand (CBOD and ammonia): the City of Snohomish, Lake Stevens Sewer District, the City of Marysville, and the City of Everett.

The WLAs for the Snohomish treatment plant are: Daily Maximum Ammonia – 99 lb/day; Daily Maximum $CBOD_5$ – 93 lb/day. Monthly average limits are calculated according to methods described in EPA's *Technical Support Document for Water Quality-Based Toxics Control* (1991). They are: Monthly Average Ammonia – 29 lb/day; Monthly Average $CBOD_5$ – 58 lb/day. These limits will apply during the low flow months of July through October.

Temperature and pH: The impact of pH and temperature were modeled using the calculations from EPA, 1988. The spreadsheet PHMIX2 showing the calculations is included in Appendix D.

Under critical conditions there is no predicted violation of the water quality standards for surface waters. Therefore, the technology-based effluent limitations for pH were placed in the permit, and temperature was not limited.

Fecal Coliform: The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 28.

Under critical conditions there is no predicted violation of the water quality standards for surface waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in the proposed permit.

Toxic Pollutants: Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. Facilities with technology-based effluent limits defined in regulation are not exempted from meeting the water quality standards for surface waters or from having surface water quality-based effluent limits.

The following toxics were determined to be present in the discharge: ammonia, chlorine, cadmium, copper, lead, selenium, silver and zinc. A reasonable potential analysis (See Ecology's spreadsheet REASPOT.XLS in Appendix D) was conducted on these parameters to determine whether or not effluent limitations would be required in this permit.

The determination of the reasonable potential for ammonia, chlorine, cadmium, copper, lead, selenium, silver, and zinc to exceed the water quality criteria was evaluated with procedures given in EPA, 1991.

Water quality criteria for metals are hardness dependent. The criteria increase with the log of hardness. Hardness varies with river flow. The critical ambient hardness used in the mixing zone study (Cosmopolitan Engineering Group, April 2001) is 19.3 mg/L as CaCO3. The metals criteria used for the reasonable potential calculation are based on the hardness at the edge of the mixing zone.

Valid ambient background data were available for ammonia, copper, cadmium, lead, silver, and zinc.

Calculations using all applicable data resulted in a determination that there is no reasonable potential for this discharge to cause a violation of water quality standards for ammonia, cadmium, copper, lead, selenium, and zinc. This determination assumes that the Permittee meets the other effluent limits of this permit.

Effluent monitoring data for silver indicate there may be a reasonable potential for the discharge to cause a violation of the water quality standards with the existing outfall. However, there is not a reasonable potential for silver violations with the new outfall diffuser. Also, the silver data from the 2004 sampling shows higher levels of silver than the 1996 sampling data and may not be representative. Therefore, a limit for silver is not included in this permit. Quarterly sampling for silver, as well as copper and zinc, will be required for the remainder of the permit term. At that time, Ecology will reevaluate the need for effluent limits.

Effluent limits were derived for chlorine, which was determined to have a reasonable potential to cause a violation of the water quality standards. Effluent limits were calculated using methods from EPA's *Technical Support Document for Water Quality-Based Toxics Control* (1991). Ecology's spreadsheet LIMIT.XLS is included in Appendix D.

G. Whole Effluent Toxicity

The water quality standards for surface waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Acute toxicity tests measure mortality as the significant response to the toxicity of the effluent. Dischargers who monitor their wastewater with acute toxicity tests are providing an indication of the potential lethal effect of the effluent to organisms in the receiving environment.

Chronic toxicity tests measure various sublethal toxic responses such as retarded growth or reduced reproduction. Chronic toxicity tests often involve either a complete life cycle test of an organism with an extremely short life cycle or a partial life cycle test on a critical stage of one of a test organism's life cycles. Organism survival is also measured in some chronic toxicity tests.

Accredited WET testing laboratories have the proper WET testing protocols, data requirements, and reporting format. Accredited laboratories are knowledgeable about WET testing and capable of calculating an NOEC, LC_{50}, EC_{50}, IC_{25}, etc. All accredited labs have been provided the most recent version of the Department of Ecology Publication # WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*, which is referenced in the permit. Any person interested in receiving a copy of this publication may call the Ecology Publications Distribution Center, 360-407-7472, for a copy. Ecology recommends that Permittees send a copy of the acute or chronic toxicity sections(s) of their permits to their laboratory of choice.

The WET tests during effluent characterization indicate that no reasonable potential exists to cause receiving water acute or chronic toxicity. Snohomish will not be given an acute or chronic WET limit. They will be required to retest the effluent prior to application for permit renewal in order to demonstrate that toxicity has not increased in the effluent.

H. Human Health

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. EPA promulgated these criteria in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Snohomish treatment plant effluent was tested for priority pollutant chemicals three times during 2004. Chemicals with human health-based criteria detected in the effluent were chloroform, toluene, and bis (2-Ethylhexyl) phthalate.

A determination of the discharge's potential to cause a violation of the water quality standards was made according to procedures in EPA's *Technical Support Document for Water Quality-Based Toxics Control* and Ecology's *Permit Writer's Manual*. The discharge shows no potential to cause a violation of water quality standards, and effluent limits are not necessary. Ecology's spreadsheet HUMAN-H is included in Appendix D. Priority pollutant testing will be repeated before the next application for permit renewal.

I. Sediment Quality

Ecology promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that Ecology may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

Ecology determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the sediment management standards.

J. Ground Water Quality Limitations

Ecology issues permits in accordance with ground water quality standards (Chapter 173-200 WAC) to protect uses of ground water. The City of Snohomish has no discharge to ground and therefore no limitations are required based on potential effects to ground water.

K. Comparison of Effluent Limits with the Existing Permit

Permit ISSUED: April 14, 2000
Modification Date: February 24, 2003

Table 8: Comparison of Effluent Limits

		PREVIOUS EFFLUENT LIMITATIONS: OUTFALL # 001		**PROPOSED EFFLUENT LIMITATIONS: OUTFALL # 001**	
Parameter		**Average Monthly**	**Average Weekly**	**Average Monthly**	**Average Weekly**
Carbonaceous Biochemical Oxygen Demand (5-day)	July-October	25 mg/L	45 mg/L	NO CHANGE	
Carbonaceous Biochemical Oxygen Demand (5-day)	November-June	25 mg/L 584 lb/day	45 mg/L 934 lb/day	NO CHANGE	
Total Suspended Solids	July-October	75 mg/L 719 lb/day	110 mg/L 1,055 lb/day	37 mg/L 355 lb/day	56 mg/L 537 lb/day
Total Suspended Solids	November-June	Flow less than or equal to 2.0 MGD: 75 mg/L 1,251 lb/day Flow greater than 2.0 MGD: 30 mg/L 200 lb/day	Flow less than or equal to 2.0 MGD: 110 mg/L 1,835 lb/day Flow greater than 2.0 MGD: 45 mg/L 300 lb/day	30 mg/L 701 lb/day	45 mg/L 1,051 lb/day
Fecal Coliform Bacteria		200/100 mL	400/100 mL	NO CHANGE	
pH		Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.		NO CHANGE	
Parameter		**Average Monthly**	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Carbonaceous Biochemical Oxygen Demand (5-day)	July-October	58 lb/day	93 lb/day	NO CHANGE	
Total Ammonia (as N)	July-October	29 lb/day	99 lb/day	NO CHANGE	
Total Residual Chlorine	Existing outfall	29 µg/L, 0.28 lb/day	76 µg/L	30 µg/L	76 µg/L
Total Residual Chlorine	4-port diffuser	79.8 µg/L, 0.77 lb/day	209 µg/L	83 µg/L	209 µg/L
Copper	Existing outfall	16.5 µg/L	24.6 µg/L	None	None
Copper	4-port diffuser	None	None	None	None

IV. MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being met.

The proposed permit also requires monitoring for copper, silver, zinc, and temperature. Ecology requires additional data to characterize the effluent and determine its potential impact on the Snohomish River.

The City monitors sludge quantity and quality to determine the appropriate uses of the sludge. Sludge monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503.

The proposed permit includes a detailed monitoring schedule under Condition S.2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* for aerated lagoons.

Lab Accreditation

With the exception of certain parameters, the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, Accreditation of Environmental Laboratories. The laboratory at this facility is accredited for General Chemistry and Microbiology, including BOD, TSS, Fecal Coliform, and pH.

V. OTHER PERMIT CONDITIONS

A. Reporting and Record Keeping

The conditions of S3 are based on Ecology's authority to specify any appropriate reporting and recordkeeping requirements to verify that permit conditions prevent and control waste discharges (WAC 173-220-210).

B. Prevention of Facility Overloading

Overloading the treatment plant would violate the terms and conditions of the permit. To prevent treatment plant overloading, RCW 90.48.110 and WAC 173-220-150 require the City of Snohomish to take the actions detailed in proposed permit Requirement S.4. The City of Snohomish must plan expansions or modifications before existing capacity is reached and must report and correct conditions that could result in new or increased discharges of pollutants. Condition S.4 restricts the amount of flow through the treatment plant.

C. Operation and Maintenance (O&M)

The proposed permit Condition S.5 is authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. Ecology includes it to ensure the City of Snohomish properly and safely operates and maintains their equipment and facilities.

D. Residual Solids Handling

To prevent water quality problems, permit Condition S.7 requires the City of Snohomish to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under Chapter 70.95J RCW and Chapter 173-308 WAC. The disposal of any other solid waste falls under the jurisdiction of the Snohomish County Health Department.

E. Pretreatment

Federal and State Pretreatment Program Requirements:
Under the terms of the addendum to the "Memorandum of Understanding between Washington Department of Ecology and the United States Environmental Protection Agency, Region 10" (1986), the Department of Ecology (Ecology) has been delegated authority to administer the Pretreatment Program. Ecology, therefore, acts as the Approval Authority for oversight of delegated Publicly Owned Treatment Works (POTWs)**.** Under this delegation of authority, Ecology issues wastewater discharge permits to significant industrial users (SIU) discharging to the City of Snohomish's wastewater treatment plant.

Under the requirements of the Pretreatment Program (40 CFR 403.8(f)(1)(iii)), Ecology is required to approve, condition, or deny new discharges or a significant increase in the discharge for existing significant industrial users (SIUs) (40 CFR 403.8 (f)(1)(i)). Industrial dischargers must obtain these permits from Ecology prior to the City of Snohomish accepting the discharge (WAC 173-216-110(5)). Such dischargers should contact Ecology to determine if a permit is required. Industrial dischargers need to apply for a state waste discharge permit sixty (60) days prior to commencing discharge.

Ecology requires the City of Snohomish to fulfill some of the functions required for the Pretreatment Program in the NPDES permit. This includes tracking the number and general nature of industrial dischargers to the sewage system. The City of Snohomish is required to identify and notify their SIUs as part of their requirement to apply for a permit. None of the obligations imposed on the City of Snohomish relieve an industrial or commercial discharger of its primary responsibility for obtaining a wastewater discharge permit (if required), including submittal of engineering reports prior to construction or modification of facilities (40 CFR 403.12(j) and WAC 173-216-070 and WAC 173-240-110, et seq.).

Requirements for Routine Identification and Reporting of Industrial Users:
The NPDES permit requires non-delegated POTWs to "take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging to the Permittee's sewerage system." Examples of such routine measures include regular review of business tax licenses for existing businesses, of water billing records, and of existing connection authorization records. System maintenance personnel should also, during performance of their jobs, identify and report as-yet unidentified industrial dischargers. Local newspapers, telephone directories, and word-of-mouth can also be important sources of information regarding new or existing discharges. The POTW must notify an industrial discharger, in writing, of its responsibilities to apply for a state waste discharge permit, and the POTW must send a copy of the written notification to Ecology. Ecology will then take steps to solicit a state waste discharge permit application.

Requirements for Performing an Industrial User Survey:
An Industrial User Survey identifies existing, new, and proposed significant industrial users and identifies potential significant industrial users. The City of Snohomish has the potential to serve significant industrial or commercial users and is required to perform an Industrial User Survey. This survey should develop a list of SIUs and PSIUs, provide sufficient information about industries which discharge to the POTW and determine which SIU(s) and PSIU(s) require issuance of state waste discharge permits or other regulatory controls. The information produced by this survey should prevent interference with treatment processes at the POTW and prevent the exceedance of water quality standards. The survey also contributes to the maintenance of sludge quality, so that sludge can be a useful biosolids product rather than an expensive waste problem. A complete listing of methodologies is available in Ecology's guidance document entitled "Conducting an Industrial User Survey."

Duty to Enforce Discharge Prohibitions:
This provision prohibits the City of Snohomish from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer.

1. The first portion of the provision prohibits acceptance of pollutants which cause pass through or interference, as defined in Appendix B of this fact sheet.

2. The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition, wastes with excessive BOD, petroleum-based oils, or which result in toxic gases are prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

3. The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from Ecology. Prohibited discharges include cooling water in significant volumes, stormwater and other direct inflow sources, and wastewaters significantly affecting system hydraulic loading, which do not require treatment.

Support by Ecology for Developing Partial Pretreatment Program by POTW: Ecology has committed to providing technical and legal assistance to the City of Snohomish in fulfilling these joint obligations. In particular, Ecology will assist with development of an adequate sewer use ordinance, notification procedures, enforcement guidelines, and development of local limits and inspection procedures.

F. Outfall Evaluation

Proposed permit Condition S.14 requires the City of Snohomish to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and diffusers, verify the installation of the new diffuser, and to determine if sediment is accumulating in the vicinity of the outfall.

G. General Conditions

General Conditions are based directly on state and federal law and regulations and have been standardized for all individual municipal NPDES permits issued by Ecology.

VI. PERMIT ISSUANCE PROCEDURES

A. Permit Modifications

Ecology may modify this permit to impose numerical limitations, if necessary, to meet water quality standards, sediment quality standards, or ground water standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit as a result of new or amended state or federal regulations.

B. Recommendations for Permit Issuance

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes that this permit be issued for five (5) years.

VII. REFERENCES FOR TEXT AND APPENDICES

Cosmopolitan Engineering Group
2001. City of Snohomish Amended Effluent Mixing Zone Study

Environmental Protection Agency (EPA)
1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.
1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.
1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.
1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a. Washington, D.C.

Law, Andrew; Berryman & Henigar/Vasey Engineering
1997. Snohomish Wastewater Treatment Plant Effluent Dilution Analysis and Effects of Effluent on Water Quality of the Snohomish River (draft)

Metcalf and Eddy.
2003. Wastewater Engineering, Treatment, Disposal, and Reuse. Fourth Edition.

Tetra Tech/KCM.
2005. General Sewer Plan & Wastewater Facilities Plan

Tsivoglou, E.C., and J.R. Wallace.
1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.
Laws and Regulations (http://www.ecy.wa.gov/laws-rules/index.html)
Permit and Wastewater Related Information (http://www.ecy.wa.gov/programs/wq/wastewater/index.html)
Water Quality information on the Snohomish River (http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?theyear=&tab=wqi&scrolly=0&sta=07A090)

Washington State Department of Ecology.
1994. Permit Writer's Manual. Publication Number 92-109
1997. Snohomish River Estuary Dry Season TMDL Study – Phase II. Publication Number 97-325
1999. Snohomish River Estuary Total Maximum Daily Load – Submittal Report. Publication Number 99-57-WQ

Water Pollution Control Federation.
1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.
1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

VIII. APPENDIX A - PUBLIC INVOLVEMENT INFORMATION

The Department of Ecology (Ecology) has tentatively determined to reissue a permit to the applicant listed on page one of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public Notice of Application (PNOA) was published on March 1, 2004, and March 8, 2004, in *The Everett Herald* to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

Ecology published a Public Notice of Draft (PNOD) on June 22, 2006, in *The Everett Herald* to inform the public that a draft permit and fact sheet were available for review. Interested persons were invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents were available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments were mailed to:

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 – 160th Avenue SE
Bellevue, WA 98008-5452

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30)-day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. Ecology will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

Ecology will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. Ecology's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from Ecology by telephone, (425) 649-7201, or by writing to the address listed above.

This permit and fact sheet were written by Laura Fricke, P.E.

IX. APPENDIX B - GLOSSARY

Acute Toxicity--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

AKART--An acronym for "all known, available, and reasonable methods of prevention, control, and treatment."

Ambient Water Quality--The existing environmental condition of the water in a receiving waterbody.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in waste water. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect waste water.

Average Monthly Discharge Limitation--The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

Average Weekly Discharge Limitation--The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

$CBOD_5$--The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celsius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining $CBOD_5$ is given in 40 CFR Part 136.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction Activity--Clearing, grading, excavation, and any other activity which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous Monitoring--Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction, e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Industrial User--A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Interference--A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in state regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

Pass Through--A discharge which exits the POTW into waters of the state in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of state water quality standards.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Potential Significant Industrial User--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 percent of treatment plant design capacity criteria and discharges <25,000 gallons per day; or
b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).
Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation Level (QL)--A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)--

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and
2) Any other industrial user that:
   - Discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater);
   - Contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant;
   - Or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

   Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

   *The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the State of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

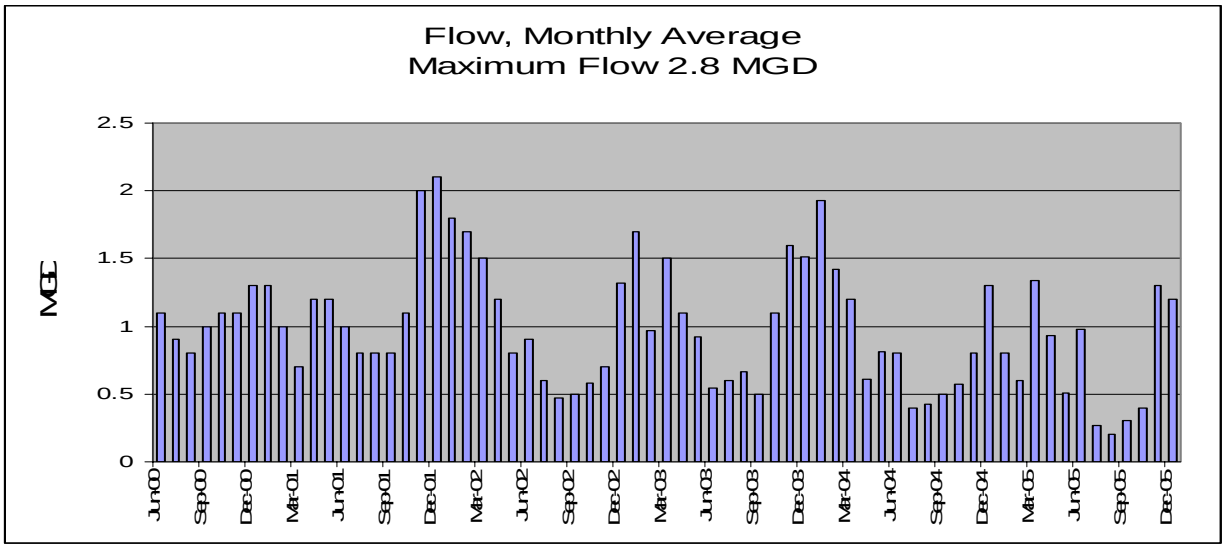
Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

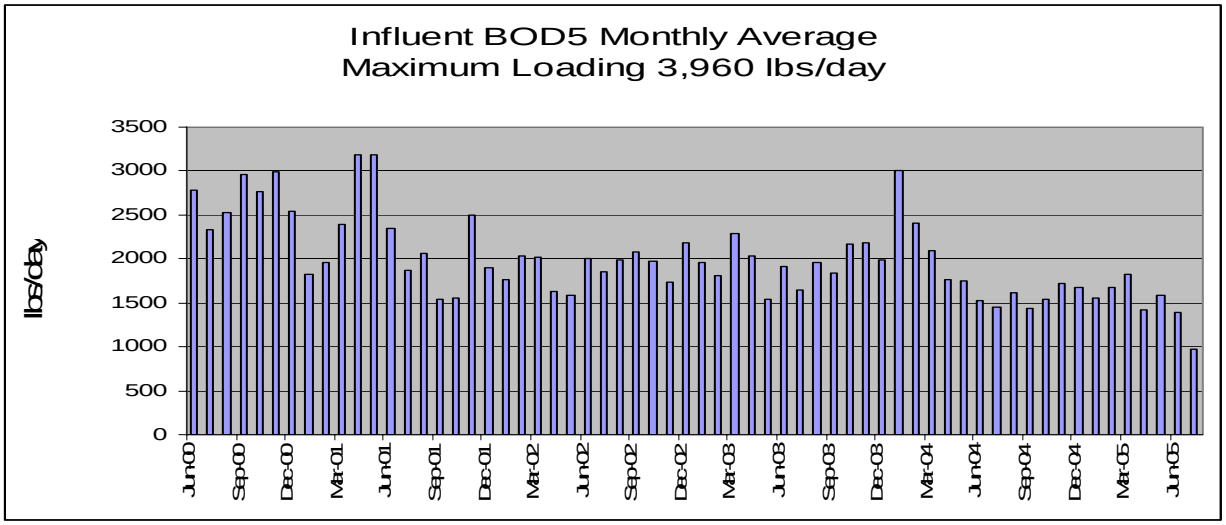
Total Suspended Solids (TSS)--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

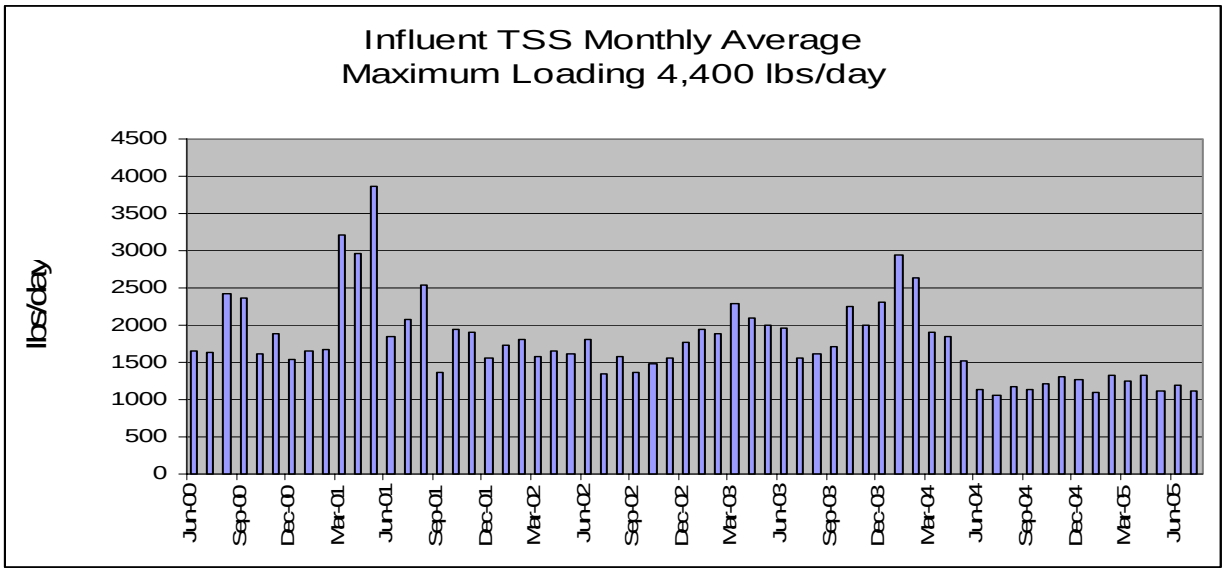
Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

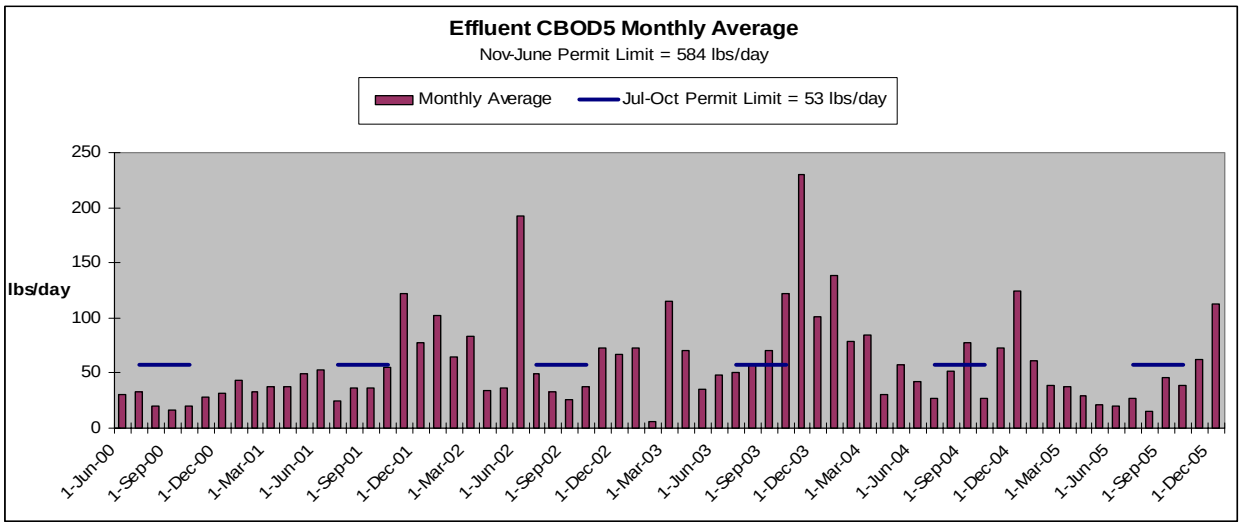
Water Quality-based Effluent Limit--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

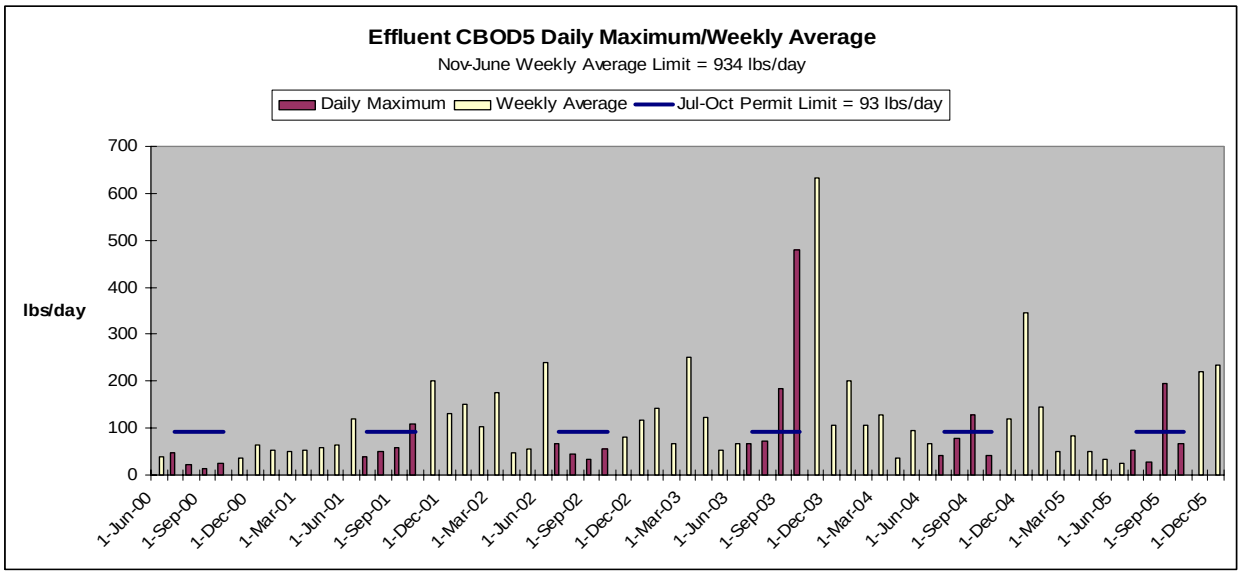
X. APPENDIX C - WASTEWATER INFLUENT AND EFFLUENT DATA

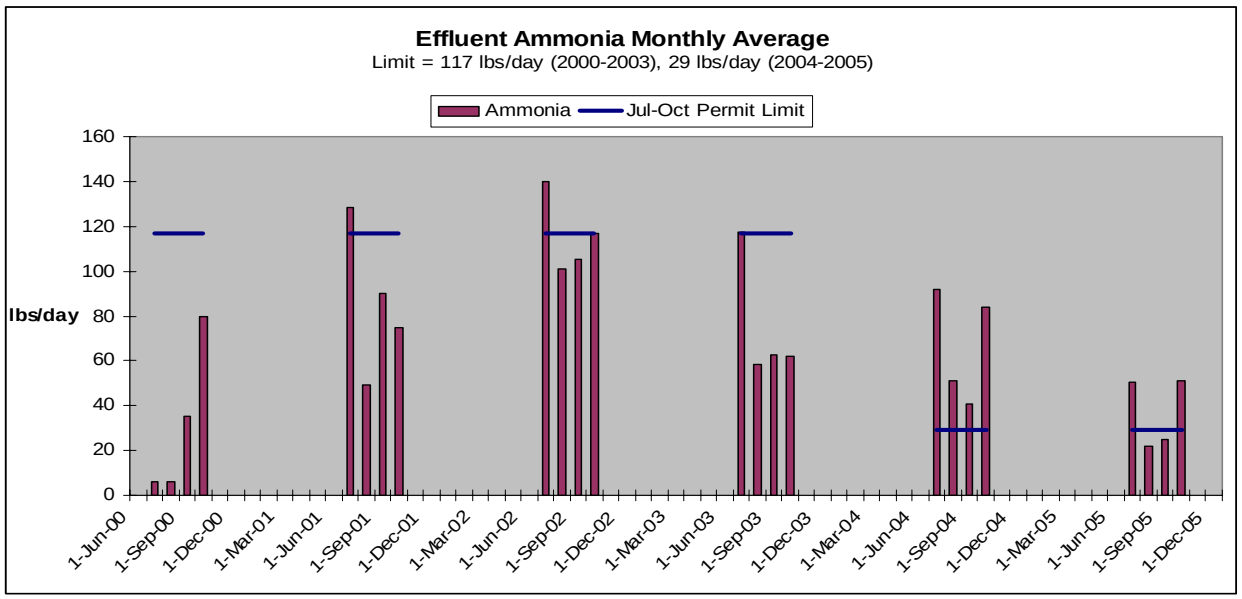







Effluent CBOD5 Monthly Average
Nov-June Permit Limit = 584 lbs/day
Monthly Average
Jul-Oct Permit Limit = 53 lbs/day
lbs/day
250
200
150
100
50
0
1-Jun-00
1-Sep-00
1-Dec-00
1-Mar-01
1-Jun-01
1-Sep-01
1-Dec-01
1-Mar-02
1-Jun-02
1-Sep-02
1-Dec-02
1-Mar-03
1-Jun-03
1-Sep-03
1-Dec-03
1-Mar-04
1-Jun-04
1-Sep-04
1-Dec-04
1-Mar-05
1-Jun-05
1-Sep-05
1-Dec-05


Effluent CBOD5 Daily Maximum/Weekly Average
Nov-June Weekly Average Limit = 934 lbs/day
Daily Maximum
Weekly Average
Jul-Oct Permit Limit = 93 lbs/day
lbs/day
700
600
500
400
300
200
100
0
1-Jun-00
1-Sep-00
1-Dec-00
1-Mar-01
1-Jun-01
1-Sep-01
1-Dec-01
1-Mar-02
1-Jun-02
1-Sep-02
1-Dec-02
1-Mar-03
1-Jun-03
1-Sep-03
1-Dec-03
1-Mar-04
1-Jun-04
1-Sep-04
1-Dec-04
1-Mar-05
1-Jun-05
1-Sep-05
1-Dec-05


Effluent Ammonia Monthly Average
Limit = 117 lbs/day (2000-2003), 29 lbs/day (2004-2005)
Ammonia
Jul-Oct Permit Limit
lbs/day
160
140
120
100
80
60
40
20
0
1-Jun-00
1-Sep-00
1-Dec-00
1-Mar-01
1-Jun-01
1-Sep-01
1-Dec-01
1-Mar-02
1-Jun-02
1-Sep-02
1-Dec-02
1-Mar-03
1-Jun-03
1-Sep-03
1-Dec-03
1-Mar-04
1-Jun-04
1-Sep-04
1-Dec-04
1-Mar-05
1-Jun-05
1-Sep-05
1-Dec-05

Copper Data Analysis

Sample Date	ug/L
6/7/2002	16.6
6/13/2002	16.7
6/21/2002	15.6
6/27/2002	14.6
7/3/2002	12.8
7/12/2002	10
7/19/2002	10.1
7/26/2002	9.4
8/2/2002	7.2
8/9/2002	7.9
8/16/2002	5.8
8/23/2002	5.5
8/30/2002	6.8
9/6/2002	9.9
9/13/2002	9.7
9/20/2002	7.5
9/27/2002	9.2
10/4/2002	11.7
10/11/2002	10.9
10/18/2002	10.4
10/22/2002	10.3
11/6/2002	12
11/15/2002	9.5
11/22/2002	12
11/27/2002	13
12/6/2002	11.1
12/13/2002	15.6
12/20/2002	7.6
12/27/2002	7.9
1/2/2003	11
1/9/2003	11
1/16/2003	12.8
1/23/2003	14.4
1/30/2003	9.6
2/6/2003	7.9
2/13/2003	7.6
2/20/2003	12.1
2/27/2003	13.2
3/6/2003	14.6
3/13/2003	12.5
3/20/2003	9.2
3/27/2003	9
4/3/2003	10.7
4/10/2003	10.6
4/17/2003	9.9
4/24/2003	10.1
5/1/2003	7.3
5/8/2003	9
5/15/2003	7.8
5/22/2003	11.4
5/29/2003	14.7
6/5/2003	9.2
6/12/2003	9.9
6/19/2003	9.6
6/26/2003	8.7
7/2/2003	7.5
7/10/2003	6.8
7/17/2003	7.8
7/24/2003	8.9
7/31/2003	8.5
8/7/2003	11
8/14/2003	8.7
8/21/2003	7.9
8/29/2003	7.8
9/4/2003	10.2
9/11/2003	9.5
9/18/2003	9.2
9/25/2003	9.7
10/2/2003	9.5
10/9/2003	8.9
10/16/2003	9.6
10/23/2003	7.5
10/30/2003	7.6
11/6/2003	7.5
11/13/2003	8.7
11/20/2003	11.1
11/25/2003	7.9
12/4/2003	8.7
12/11/2003	14.8
12/18/2003	9.4
1/1/2004	18
1/8/2004	12.2
1/15/2004	6.9
1/22/2004	10.5
1/29/2004	8.4
2/5/2004	7.6
2/12/2004	10
2/19/2004	9.1
2/26/2004	8.4
3/4/2004	10.3
3/11/2004	9.3
3/18/2004	9.1
3/25/2004	9
4/1/2004	10
4/8/2004	8
4/15/2004	9
4/22/2004	7
4/29/2004	8
5/6/2004	6
5/13/2004	6.8
5/20/2004	7.7
5/27/2004	13
4/20/2004	14
5/25/2004	12
6/10/2004	7

Statistical Data Analysis - Copper	
Mean	9.93
Standard Error	0.25
Median	9.50
Mode	7.90
Standard Deviation	2.55
Sample Variance	6.48
Kurtosis	0.72
Skewness	0.97
Range	12.50
Minimum	5.50
Maximum	18.00
Sum	1043.10
Count	105.00
CV	0.26
95th Percentile	14.80

Silver Data Analysis

Sample Date	***ug/L***
4/20/2004	1.4
5/25/2004	1.4
6/10/2004	0.8
8/5/1996	0.7
8/12/1996	0.6
8/20/1996	0.4
8/26/1996	0.4
9/2/1996	0.5
9/10/1996	0.5
9/17/1996	0.4
9/24/1996	0.4
10/1/1996	0.3
10/8/1996	0.3
10/15/1996	0.3
10/22/1996	0.5
10/29/1996	0.4

Statistical Data Analysis - Silver	
Mean	0.58
Standard Error	0.09
Median	0.45
Mode	0.40
Standard Deviation	0.35
Sample Variance	0.12
Kurtosis	2.52
Skewness	1.82
Range	1.10
Minimum	0.30
Maximum	1.40
Sum	9.30
Count	16.00
CV	0.60
95th percentile	1.40

Zinc Data Analysis

Sample Date	***ug/L***
4/20/2004	12
5/25/2004	42
6/10/2004	14
8/5/1996	21.8
8/12/1996	27.5
8/20/1996	23.9
8/26/1996	26.2
9/2/1996	24.4
9/10/1996	30.5
9/17/1996	25.2
9/24/1996	24
10/1/1996	27.1
10/8/1996	26.2
10/15/1996	25.4
10/22/1996	25.3
10/29/1996	24.4

Statistical Data Analysis - Zinc	
Mean	24.99
Standard Error	1.63
Median	25.25
Mode	26.20
Standard Deviation	6.51
Sample Variance	42.42
Kurtosis	3.37
Skewness	0.43
Range	30.00
Minimum	12.00
Maximum	42.00
Sum	399.90
Count	16.00
CV	0.26
95th percentile	33.38

Sampling Results from NPDES Permit Application
(Copper, Silver, Zinc shown on previous pages)

	Total Dissolved Solids (mg/L)	Total Phosphorus (ug/L)	Cadmium (ug/L)	Lead (ug/L)	Selenium (ug/L)
4/20/2004	192	3990	ND	1.00	2.00
5/25/2004	250	5740	0.30	2.00	ND
6/10/2004	168	3560	ND	ND	ND

	Acetone (ug/L)	Chloroform (ug/L)	Toluene (ug/L)	bis (2-Ethylhexyl) phthalate (ug/L)	Phenol (mg/L)
4/20/2004	ND	1.70	6.10	30.00	ND
5/25/2004	6.70	2.20	2.80	34.00	0.08
6/10/2004	ND	ND	1.60	37.00	ND

Whole Effluent Toxicity Testing Results

Snohomish WWTP Chronic WET Test Results as NOEC/LOEC in % Effluent

Test #	Sample Date	Start Date	Lab	Organism	Endpoint	NOEC	LOEC	MSDp
RMAR263	8/12/2003 8:40	8/12/2003 15:30	AMEC NW	*Ceriodaphnia dubia*	7-day Survival	50	100	
					Reproduction	9.1	25	28.52%
RMAR262	8/12/2003 8:40	8/12/2003 16:30	AMEC NW	fathead minnow	7-day Survival	50	100	12.01%
					Biomass	25	50	16.94%
					Weight	25	50	20.40%
RMAR259	11/18/2003 8:00	11/18/2003 14:30	AMEC NW	*Ceriodaphnia dubia*	7-day Survival	100	> 100	
					Reproduction	9.1	25	11.51%
RMAR258	11/18/2003 8:00	11/18/2003 14:30	AMEC NW	fathead minnow	7-day Survival	50	100	11.46%
					Biomass	25	50	17.01%
					Weight	50	100	15.09%

Snohomish WWTP Acute WET Test Results as % Survival in 100% Effluent

Test #	Sample Date	Start Date	Lab	Organism	Endpoint	% Survival
RMAR261	8/12/2003 8:40	8/12/2003 16:00	AMEC NW	*Ceriodaphnia dubia*	48-hour Survival	85.0%
RMAR260	8/12/2003 8:40	8/13/2003 12:30	AMEC NW	fathead minnow	96-hour Survival	85.0%
RMAR257	11/18/2003 8:00	11/18/2003 16:00	AMEC NW	*Ceriodaphnia dubia*	48-hour Survival	100.0%
RMAR256	11/18/2003 8:00	11/18/2003 15:30	AMEC NW	fathead minnow	96-hour Survival	82.5%

Snohomish WWTP Acute WET Test Results as NOEC/LOEC in % Effluent

Test #	Sample Date	Start Date	Lab	Organism	Endpoint	NOEC	LOEC	MSDp
RMAR261	8/12/2003 8:40	8/12/2003 16:00	AMEC NW	*Ceriodaphnia dubia*	48-hour Survival	100	> 100	13.69%
RMAR260	8/12/2003 8:40	8/13/2003 12:30	AMEC NW	fathead minnow	96-hour Survival	100	> 100	13.54%
RMAR257	11/18/2003 8:00	11/18/2003 16:00	AMEC NW	*Ceriodaphnia dubia*	48-hour Survival	100	> 100	5.00%
RMAR256	11/18/2003 8:00	11/18/2003 15:30	AMEC NW	fathead minnow	96-hour Survival	100	> 100	17.30%

XI. APPENDIX D - TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on Ecology's Water Quality homepage at (http://www.ecy.wa.gov/programs/wq/wastewater/index.html).

The following spreadsheets are included in this appendix:

- Water Quality Criteria (CRITERIA.XLS)
- Hardness Calculation for Acute and Chronic Mixing Zones
- Ammonia Water Quality Criteria Calculation (AMMONIAfw.XLS)
- Reasonable Potential Calculation – Existing Outfall (REASPOT.XLS)
- Reasonable Potential Calculation – New Outfall Diffuser (REASPOT.XLS)
- Permit Limit Calculation (LIMIT.XLS)
- Reasonable Potential Calculation for Human Health Criteria (HUMAN-H.XLS)
- Calculation of pH and Temperature (PHMIX2.XLS)

(CRITERIA.XLS)

WATER QUALITY CRITERIA (in ug/L unless otherwise noted)

Pollutant, CAS No. & Application Ref. No.	Priority Pollutant	Carcin-ogen	Fresh Water Quality Criteria						Fresh Water Human Health Criteria	Organoleptic Effects Criteria
			Hardness = 20.16		Hardness = 21.55		Hardness = 25.57			
			acute	chronic	acute	chronic	acute	chronic		
CADMIUM - 7440439 4M Hardness dependent	Y	N	0.65	0.31	0.70	0.33	0.84	0.38		
CHLORINE (Total Residual) 7782505	N	N	19.00	11.00	19.00	11.00	19.00	11.00		
COPPER - 744058 6M Hardness dependent	Y	N	3.76	2.89	4.01	3.06	4.71	3.54		1000.00
LEAD - 7439921 7M Dependent on hardness	Y	N	10.89	0.42	11.74	0.46	14.24	0.55		
SELENIUM 7782492 10M	Y	N	20.00	5.00	20.00	5.00	20.00	5.00	170.00	
SILVER - 7740224 11M dependent on hardness.	Y	N	0.22	NA	0.25	NA	0.33	NA		
ZINC- 7440666 13M hardness dependent	Y	N	29.46	26.91	31.18	28.47	36.04	32.91		5000.00
BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	Y	Y							1.80	
CHLOROFORM 67663 11V	Y	Y							5.70	
TOLUENE 108883 25V	Y	N							6800.00	

Hardness Calculation for Acute and Chronic Mixing Zones

Effluent Hardness	Ambient Hardness	Acute Dilution	Acute MZ Hardness	Chronic Dilution	Chronic MZ Hardness
44.50	19.26	4.00	25.57	28.00	20.16
44.50	19.26	11.00	21.55	28.00	20.16

AMMONIA WATER QUALITY CRITERIA CALCULATION (AMMONIAfw.XLS)

INPUT		
1. Ambient Temperature (deg C; 0<T<30)	17.6	(90th percentile 1994-2004)
2. Ambient pH (6.5<pH<9.0)	7.40	(90th percentile 1994-2004)
3. Acute TCAP (Salmonids present- 20; absent- 25)	20	
4. Chronic TCAP (Salmonids present- 15; absent- 20)	15	
OUTPUT		
1. Intermediate Calculations:		
Acute FT	1.18	
Chronic FT	1.41	
FPH	1.60	
RATIO	20	
pKa	9.48	
Fraction Of Total Ammonia Present As Un-ionized	0.8291%	
2. Un-ionized Ammonia Criteria		
Acute (1-hour) Un-ionized Ammonia Criterion (ug NH3/L)	137.7	
Chronic (4-day) Un-ionized Ammonia Criterion (ug NH3/L)	17.5	
3. Total Ammonia Criteria:		
Acute Total Ammonia Criterion (mg NH3+ NH4/L)	16.6	
Chronic Total Ammonia Criterion (mg NH3+ NH4/L)	2.1	
4. Total Ammonia Criteria expressed as Nitrogen:		
Acute Ammonia Criterion as mg N	**13.7**	
Chronic Ammonia Criterion as N	**1.74**	

REASONABLE POTENTIAL CALCULATION (REASPOT.XLS)

EXISTING OUTFALL

				State Water Quality Standard		Max concentration at edge of...											
Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) *ug/L*	Acute *ug/L*	Chronic *ug/L*	Acute Mixing Zone *ug/L*	Chronic Mixing Zone *ug/L*	**LIMIT REQ'D?**	Effluent percentile value	*Pn*	Max effluent conc. measured (metals as total recoverable) *ug/L*	Coeff Variation *CV*	*s*	# of samples *n*	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor
Ammonia	1.00	1.00	0.100	13700	1740	8250	1179	NO	0.95	0.986	33000.00	0.54	0.51	208	1.00	4	28
Copper	0.996	0.996	0.850	4.71	2.89	4.32	1.35	NO	0.95	0.972	14.80	0.26	0.26	105	1.00	4	28
Chlorine	1.00	1.00	0.000	19.00	11.00	23.50	3.36	YES	0.95	0.970	94.00	0.60	0.55	100	1.00	4	28
Cadmium	0.943	0.943	0.036	0.84	0.31	0.24	0.07	NO	0.95	0.368	0.30	0.60	0.55	3	3.00	4	28
Lead	0.466	0.466	0.040	14.24	0.42	0.73	0.14	NO	0.95	0.368	2.00	0.60	0.55	3	3.00	4	28
Selenium				20.00	5.00	1.50	0.21	NO	0.95	0.368	2.00	0.60	0.55	3	3.00	4	28
Silver	0.850		0.000	0.33	100.00	0.44	0.07	YES	0.95	0.829	1.40	0.60	0.55	16	1.47	4	28
Zinc	0.996	0.996	3.200	36.04	26.91	12.21	4.49	NO	0.95	0.829	33.00	0.26	0.26	16	1.19	4	28

NEW OUTFALL DIFFUSER

				State Water Quality Standard		Max concentration at edge of...											
Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) *ug/L*	Acute *ug/L*	Chronic *ug/L*	Acute Mixing Zone *ug/L*	Chronic Mixing Zone *ug/L*	**LIMIT REQ'D?**	Effluent percentile value	*Pn*	Max effluent conc. measured (metals as total recoverable) *ug/L*	Coeff Variation *CV*	*s*	# of samples *n*	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor
Ammonia	1.00	1.00	0.100	13700	1740	3000	1179	NO	0.95	0.986	33000.00	0.54	0.51	208	1.00	11	28
Copper	0.996	0.996	0.850	4.01	2.89	2.11	1.35	NO	0.95	0.972	14.80	0.26	0.26	105	1.00	11	28
Chlorine	1.00	1.00	0.000	19.00	11.00	8.55	3.36	NO	0.95	0.970	94.00	0.60	0.55	100	1.00	11	28
Cadmium	0.943	0.943	0.036	0.70	0.31	0.11	0.07	NO	0.95	0.368	0.30	0.60	0.55	3	3.00	11	28
Lead	0.466	0.466	0.040	11.74	0.42	0.29	0.14	NO	0.95	0.368	2.00	0.60	0.55	3	3.00	11	28
Selenium				20.00	5.00	0.55	0.21	NO	0.95	0.368	2.00	0.60	0.55	3	3.00	11	28
Silver	0.850		0.000	0.25	100.00	0.16	0.07	NO	0.95	0.829	1.40	0.60	0.55	16	1.47	11	28
Zinc	0.996	0.996	3.200	31.18	26.91	6.48	4.49	NO	0.95	0.829	33.00	0.26	0.26	16	1.19	11	28

PERMIT LIMIT CALCULATION (LIMIT.XLS)

	Permit Limit Calculation Summary						Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit limit calculation			
PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Water Quality Standard Acute *ug/L*	Water Quality Standard Chronic *ug/L*	**Average Monthly Limit (AML)** ug/L	**Maximum Daily Limit (MDL)** ug/L	WLA Acute *ug/L*	WLA Chronic *ug/L*	LTA Acute *ug/L*	LTA Chronic *ug/L*	LTA Coeff. Var. (CV) *decimal*	LTA Prob'y Basis *decimal*	Limiting LTA *ug/L*	Coeff. Var. (CV) *decimal*	AML Prob'y Basis *decimal*	MDL Prob'y Basis *decimal*	# of Samples per Month *n*
Chlorine	4.00 existing outfall	28.00	19.00	11.00	**30.1**	**76.0**	76	308.00	24.4	162.4	0.60	0.99	24.4	0.60	0.95	0.99	20.00
Chlorine	11.00 new diffuser	28.00	19.00	11.00	**82.9**	**209.0**	209	308.00	67.1	162.4	0.60	0.99	67.1	0.60	0.95	0.99	20.00

REASONABLE POTENTIAL CALCULATION FOR HUMAN HEALTH CRITERIA (HUMAN-H.XLS)

	Ambient Concentration (Geometric Mean)	Water Quality Criteria for Protection of Human Health	Max concentration at edge of chronic mixing zone.	**LIMIT REQ'D?**	**Expected Number of Compliance Samples per Month**	**AVERAGE MONTHLY EFFLUENT LIMIT**	**MAXIMUM DAILY EFFLUENT LIMIT**	Estimated Percentile at 95% Confidence		Max effluent conc. measured	Coeff Variation		# of samples from which # in col. K was taken	Multiplier	Dilution Factor
Parameter	*ug/L*	*ug/L*	*ug/L*			*ug/L*	*ug/L*		*Pn*	*ug/L*	*CV*	**S**	*n*		
BIS(2-ETHYLHEXYL) PHTHALATE 117817	0.00	1.8	1.59	**NO**	**4.00**	**NONE**	**NONE**	0.50	0.37	37.00	0.60	0.6	3	1.20	28.0
CHLOROFORM 67663 11V	0.00	5.70	0.09	**NO**	**4.00**	**NONE**	**NONE**	0.50	0.37	2.20	0.60	0.6	3	1.20	28.0
TOLUENE 108883 25V	0.00	1000.00	0.26	**NO**	**4.00**	**NONE**	**NONE**	0.50	0.37	6.10	0.60	0.6	3	1.20	28.0

CALCULATION OF pH AND TEMPERATURE (PHMIX2.XLS)

INPUT		
1. DILUTION FACTOR AT MIXING ZONE BOUNDARY	28.000	28.000
1. UPSTREAM/BACKGROUND CHARACTERISTICS		
Temperature (deg C):	16.30	16.30
pH:	7.40	7.40
Alkalinity (mg CaCO3/L):	19.30	19.30
2. EFFLUENT CHARACTERISTICS		
Temperature (deg C):	20.80	20.80
pH:	6.00	9.00
Alkalinity (mg CaCO3/L):	44.50	44.50
OUTPUT		
1. IONIZATION CONSTANTS		
Upstream/Background pKa:	6.41	6.41
Effluent pKa:	6.38	6.38
2. IONIZATION FRACTIONS		
Upstream/Background Ionization Fraction:	0.91	0.91
Effluent Ionization Fraction:	0.30	1.00
3. TOTAL INORGANIC CARBON		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	21.27	21.27
Effluent Total Inorganic Carbon (mg CaCO3/L):	150.39	44.61
4. CONDITIONS AT MIXING ZONE BOUNDARY		
Temperature (deg C):	16.46	16.46
Alkalinity (mg CaCO3/L):	20.20	20.20
Total Inorganic Carbon (mg CaCO3/L):	25.88	22.11
pKa:	6.41	6.41
pH at Mixing Zone Boundary:	6.96	7.43

XII. APPENDIX E - RESPONSE TO COMMENTS

Ecology did not receive any comments during the public review period for this permit.